

Claims

- [c1] What is claimed is:
1. A hybrid protein comprising:
 - (i) a protein undergoing at least one reaction of binding to a receptor of at least one cell type selected from the group consisting of mastocytes and basophils and being endocytosed by the at least one cell type selected from the group consisting of the mastocytes and basophils;
 - (ii) a protease cleaving one or more proteins of the secretion process of the at least one cell type selected from the group consisting of the mastocytes and basophils so as to inhibit the secretion process without killing the at least one cell type selected from the group consisting of the mastocytes and basophils, wherein the protease (ii) is selected from the group consisting of:
 - light chain of a Clostridium botulinum toxin;
 - proteolytically active fragment of the light chain of a Clostridium botulinum toxin containing an amino acid sequence His-Xaa-Xaa-Xaa-His-Xaa-Xaa-His, wherein Xaa is selected from the group of amino acids;
 - light chain of the tetanus toxin (TeNT);
 - proteolytically active fragment of the light chain of the tetanus toxin containing an amino acid sequence His-Asp-Leu-Ile-His-Val-Leu-His;
 - IgA protease of Neisseria gonorrhoeae; and
 - proteolytic domain of the IgA protease of Neisseria gonorrhoeae.
- [c2] 2. The hybrid protein according to claim 1, wherein the Clostridium botulinum toxin is a toxin of type A, B, C1, D, E, F, or G.
- [c3] 3. The hybrid protein according to claim 1, wherein the protein (i) is selected from the group consisting of:
- IgE;
 - IgE fragment;
 - IgE Fc fragment;
 - antibody against IgE receptor of the at least one of the mastocytes and basophils; fragment of the antibody against the IgE receptor of the at least one of the mastocytes and basophils; antibody against mastocyte specific potassium channel; and

–MCD (mast cell degranulating) peptide.

- [c4] 4. The hybrid protein according to claim 3, wherein the fragment of the antibody against the IgE receptor of the at least one of the mastocytes and basophils is a Fab fragment.
- [c5] 5. The hybrid protein according to claim 3, further comprising the N terminal portion of a heavy chain of a toxin (H_N fragment) or a fragment thereof in addition to the light chain of a Clostridium botulinum toxin or of the tetanus toxin.
- [c6] 6. A hybrid protein comprising: ✓
- (i) a protein undergoing at least one reaction of binding to a receptor of at least one cell type selected from the group consisting of mastocytes and basophils and being endocytosed by the at least one cell type selected from the group consisting of the mastocytes and basophils, wherein the protein is selected from the group consisting of:
- IgE;
 - IgE fragment;
 - IgE Fc fragment;
 - antibody against IgE receptor of the at least one cell type selected from the group consisting of the mastocytes and basophils; fragment of the antibody against the IgE receptor of the at least one cell type selected from the group consisting of the mastocytes and basophils; antibody against mastocyte specific potassium channel; and
 - MCD (mast cell degranulating) peptide; and
- (ii) a protease cleaving one or more proteins of the secretion process of the at least one cell type selected from the group consisting of the mastocytes and basophils so as to inhibit the secretion process without killing the at least one cell type selected from the group consisting of the mastocytes and basophils, wherein the protease is selected from the group consisting of:
- light chain of a Clostridium botulinum toxin;
 - proteolytically active fragment of the light chain of a Clostridium botulinum toxin containing an amino acid sequence His-Xaa-Xaa-Xaa-His-Xaa-Xaa-His



wherein Xaa is selected from the group of amino acids;

-light chain of the tetanus toxin (TeNT);

-proteolytically active fragment of the light chain of the tetanus toxin containing an amino acid sequence His-Asp-Leu-Ile-His-Val-Leu-His;

-IgA protease of *Neisseria gonorrhoeae*; and

-proteolytic domain of the IgA protease of *Neisseria gonorrhoeae*.

- [c7] 7. The hybrid protein according to claim 6, wherein the fragment of the antibody against the IgE receptor of the at least one of the mastocytes and basophils is a Fab fragment.
- [c8] 8. The hybrid protein according to claim 6, wherein the *Clostridium botulinum* toxin is a toxin of type A, B, C1, D, E, F, or G.
- [c9] 9. The hybrid protein according to claim 6, further comprising the N-terminal portion of a heavy chain of a botulinum toxin or a tetanus toxin (H_N fragment) or a fragment of the N-terminal portion of the heavy chain of the botulinum toxin or the tetanus toxin in addition to the light chain of the *Clostridium botulinum* toxin or of the tetanus toxin.
- [c10] 10. A method of inhibiting degranulation of mastocytes and basophils by administering an effective amount of a hybrid protein according to claim 1.
- [c11] 11. A method of inhibiting degranulation of mastocytes and basophils by administering an effective amount of a hybrid protein according to claim 6.